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Ganguly

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(54) **ELECTRONIC AUTHENTICATION DOCUMENT SYSTEM AND METHOD**

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G06F 21/31	(2013.01)
G06F 21/32	(2013.01)

(52) **U.S. Cl.**
CPC ***G06F 21/31*** (2013.01); ***G06F 21/32*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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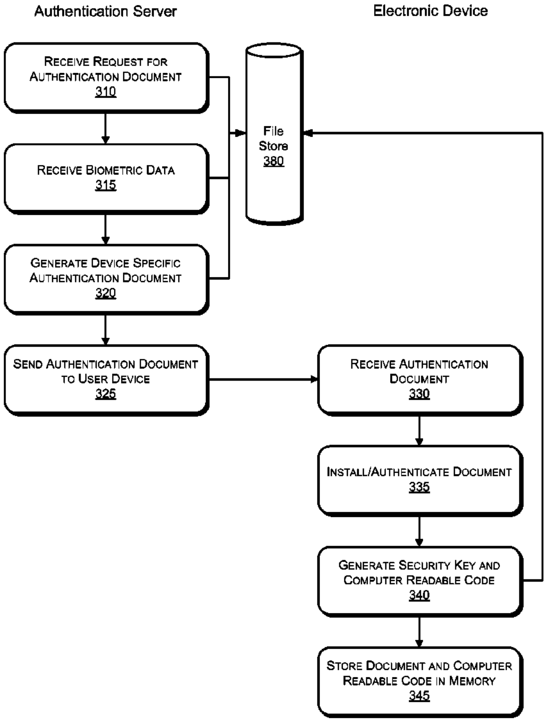
(57) **ABSTRACT**

In one embodiment a controller comprises logic configured to receive a document copy, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic, generate, with the authentication algorithm logic, a security key for the document copy based on at least one input from the user, transmit the security key to a remote device, and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory. Other embodiments may be described.

25 Claims, 9 Drawing Sheets


Authentication Server
Electronic Device
Receive Request for Authentication Document 310
Receive Biometric Data 315
Generate Device Specific Authentication Document 320
Send Authentication Document to User Device 325
File Store 380
Receive Authentication Document 330
Install/Authenticate Document 335
Generate Security Key and Computer Readable Code 340
Store Document and Computer Readable Code in Memory 345

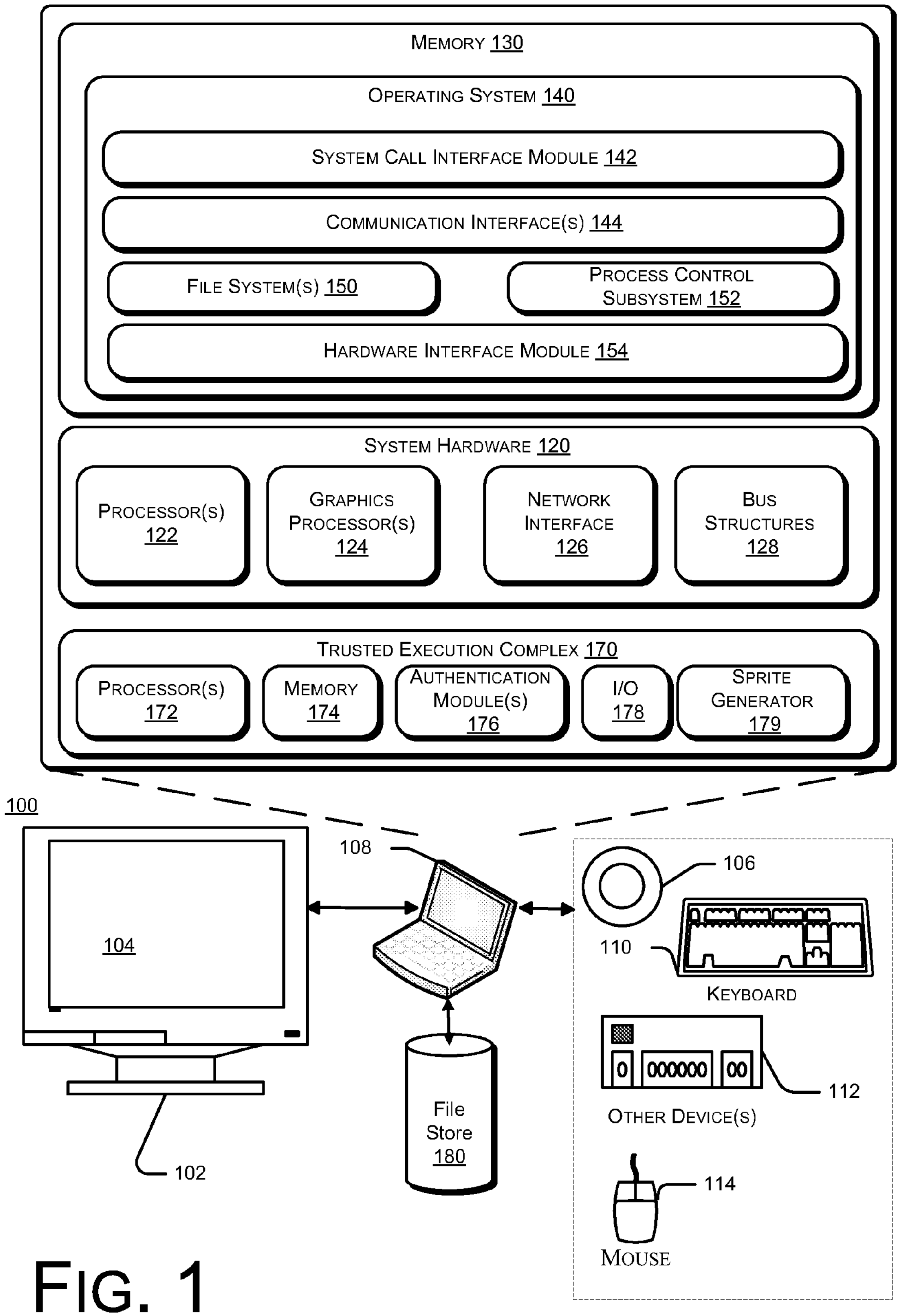

MEMORY 130
OPERATING SYSTEM 140
SYSTEM CALL INTERFACE MODULE 142
COMMUNICATION INTERFACE(S) 144
FILE SYSTEM(S) 150
PROCESS CONTROL SUBSYSTEM 152
HARDWARE INTERFACE MODULE 154
SYSTEM HARDWARE 120
PROCESSOR(S) 122
GRAPHICS PROCESSOR(S) 124
NETWORK INTERFACE 126
BUS STRUCTURES 128
TRUSTED EXECUTION COMPLEX 170
PROCESSOR(S) 172
MEMORY 174
AUTHENTICATION MODULE(S) 176
I/O 178
SPRITE GENERATOR 179
100
104
102
108
File Store 180
106
110
KEYBOARD
112
OTHER DEVICE(S)
114
MOUSE

FIG. 1

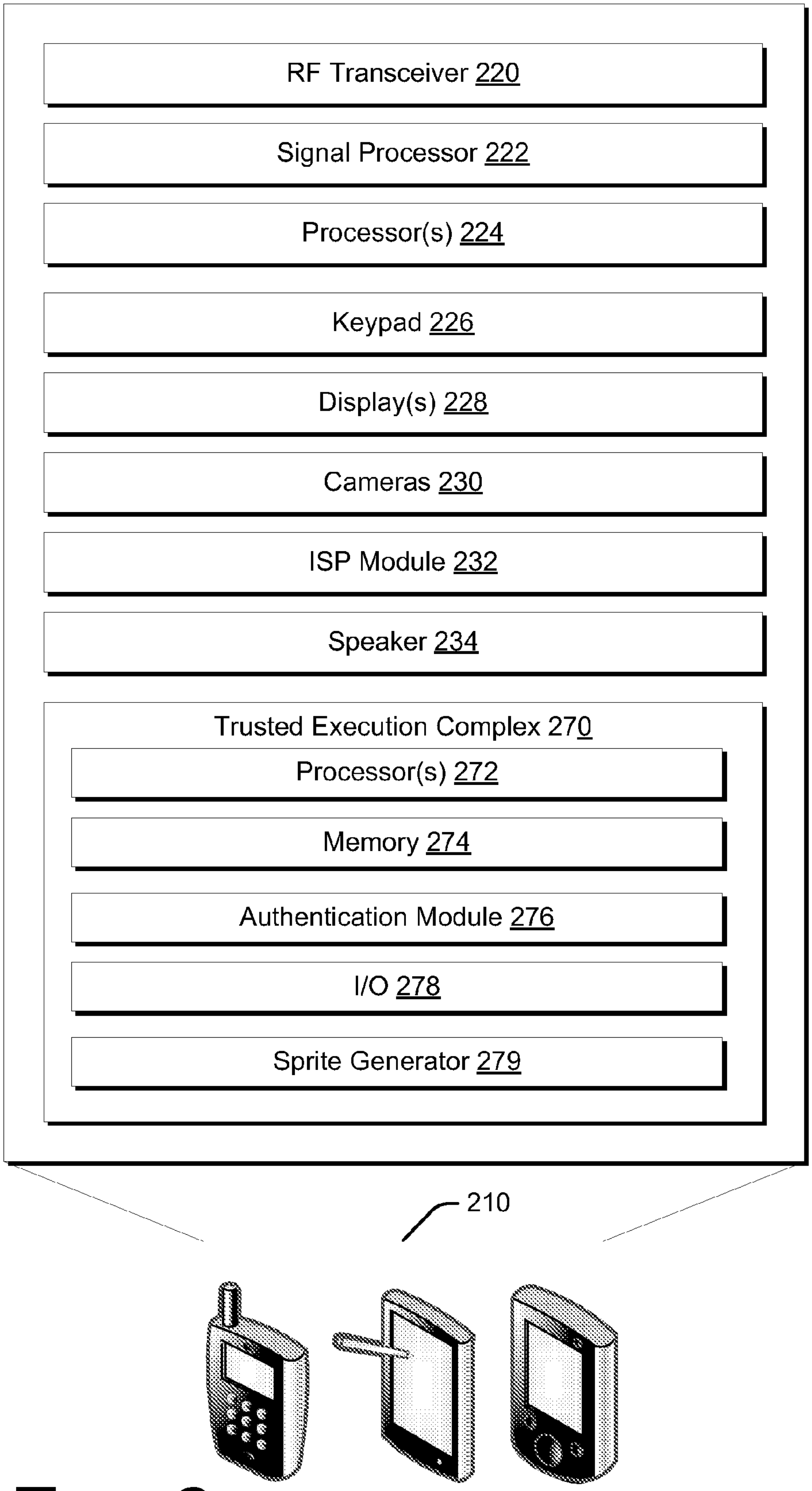

RF Transceiver 220
Signal Processor 222
Processor(s) 224
Keypad 226
Display(s) 228
Cameras 230
ISP Module 232
Speaker 234
Trusted Execution Complex 270
Processor(s) 272
Memory 274
Authentication Module 276
I/O 278
Sprite Generator 279
210

FIG. 2

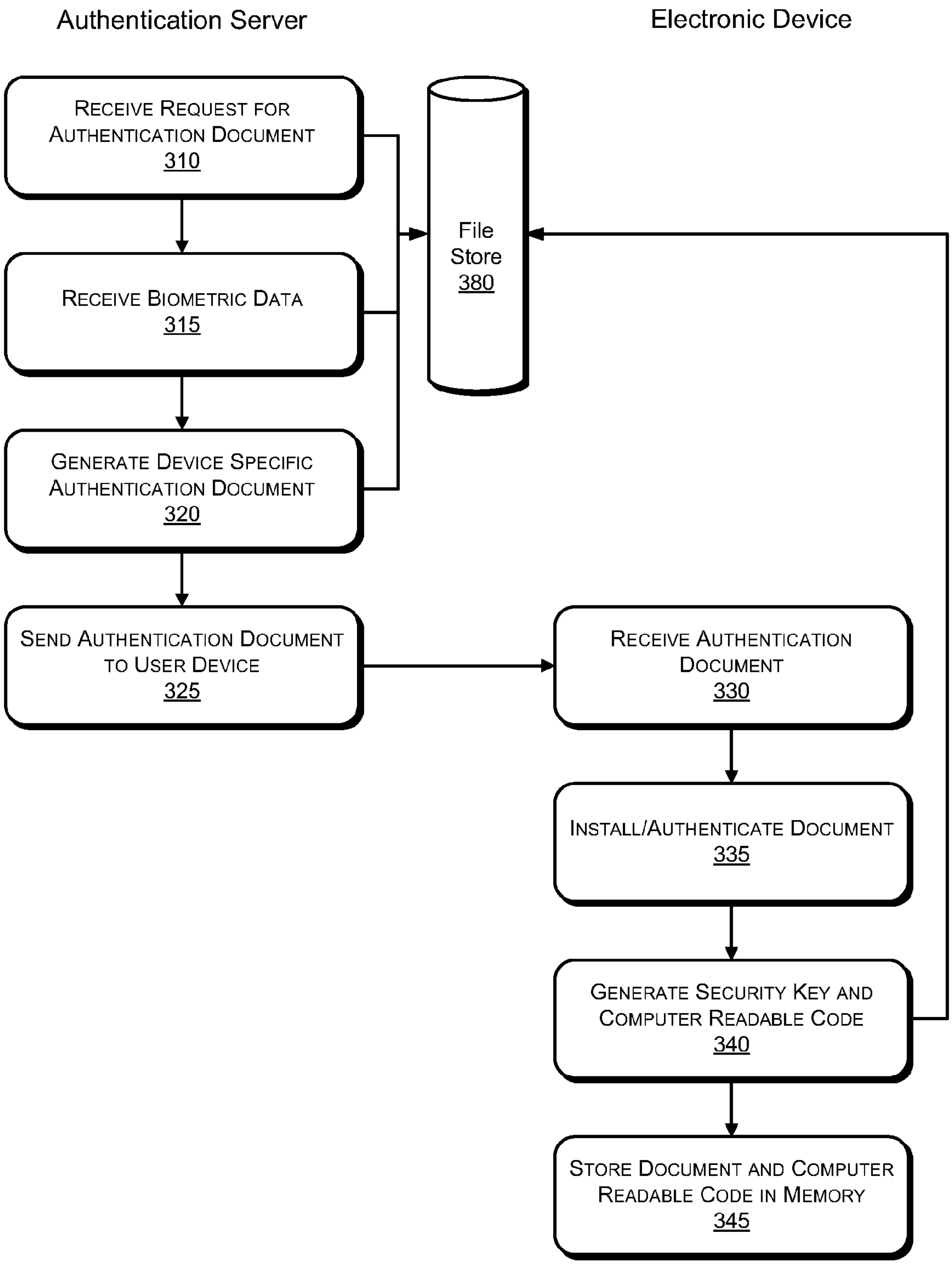

Authentication Server
Electronic Device
RECEIVE REQUEST FOR AUTHENTICATION DOCUMENT 310
RECEIVE BIOMETRIC DATA 315
GENERATE DEVICE SPECIFIC AUTHENTICATION DOCUMENT 320
SEND AUTHENTICATION DOCUMENT TO USER DEVICE 325
File Store 380
RECEIVE AUTHENTICATION DOCUMENT 330
INSTALL/AUTHENTICATE DOCUMENT 335
GENERATE SECURITY KEY AND COMPUTER READABLE CODE 340
STORE DOCUMENT AND COMPUTER READABLE CODE IN MEMORY 345

FIG. 3

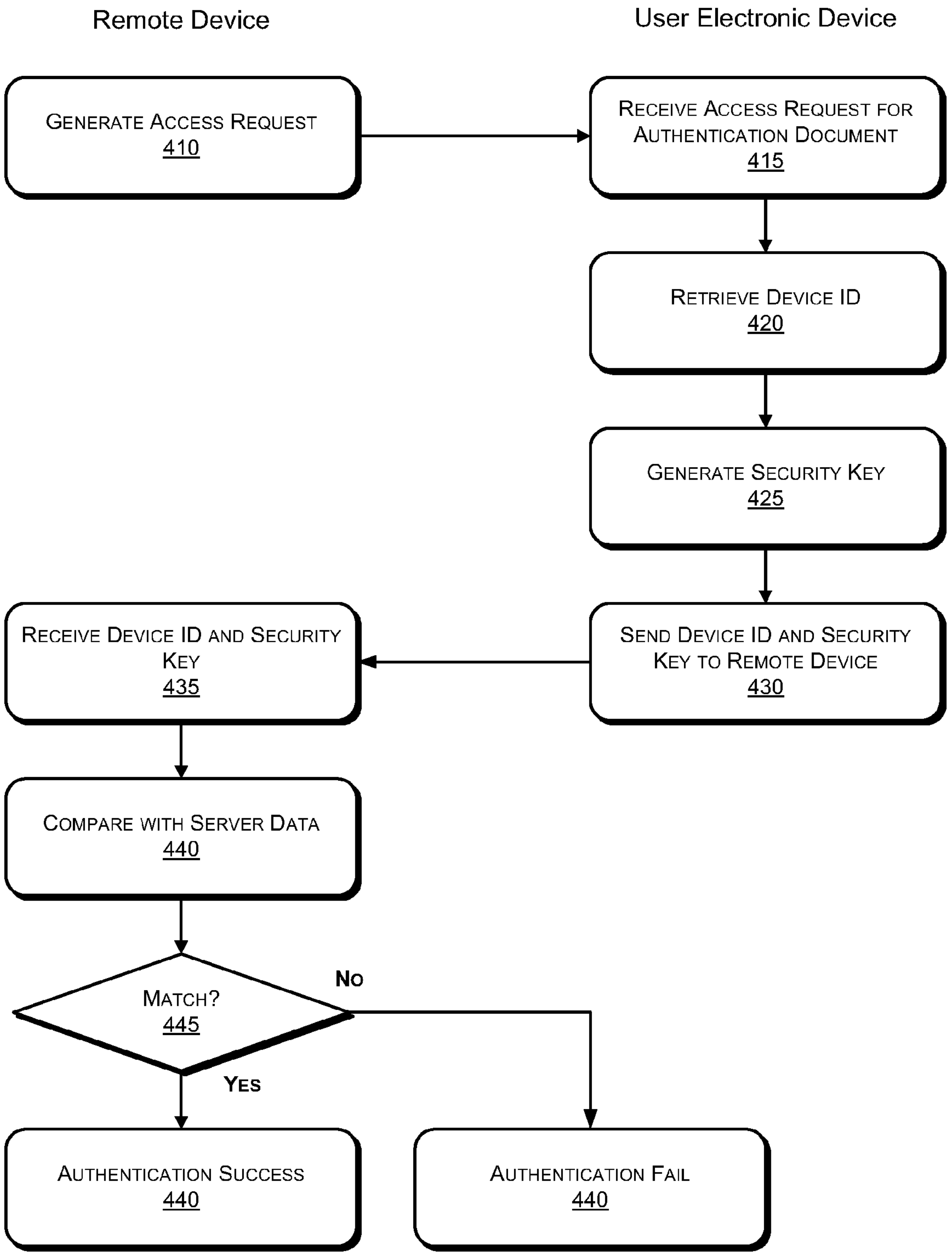

Remote Device
User Electronic Device
Generate Access Request
410
Receive Access Request for Authentication Document
415
Retrieve Device ID
420
Generate Security Key
425
Send Device ID and Security Key to Remote Device
430
Receive Device ID and Security Key
435
Compare with Server Data
440
Match?
445
No
Yes
Authentication Success
440
Authentication Fail
440

FIG. 4

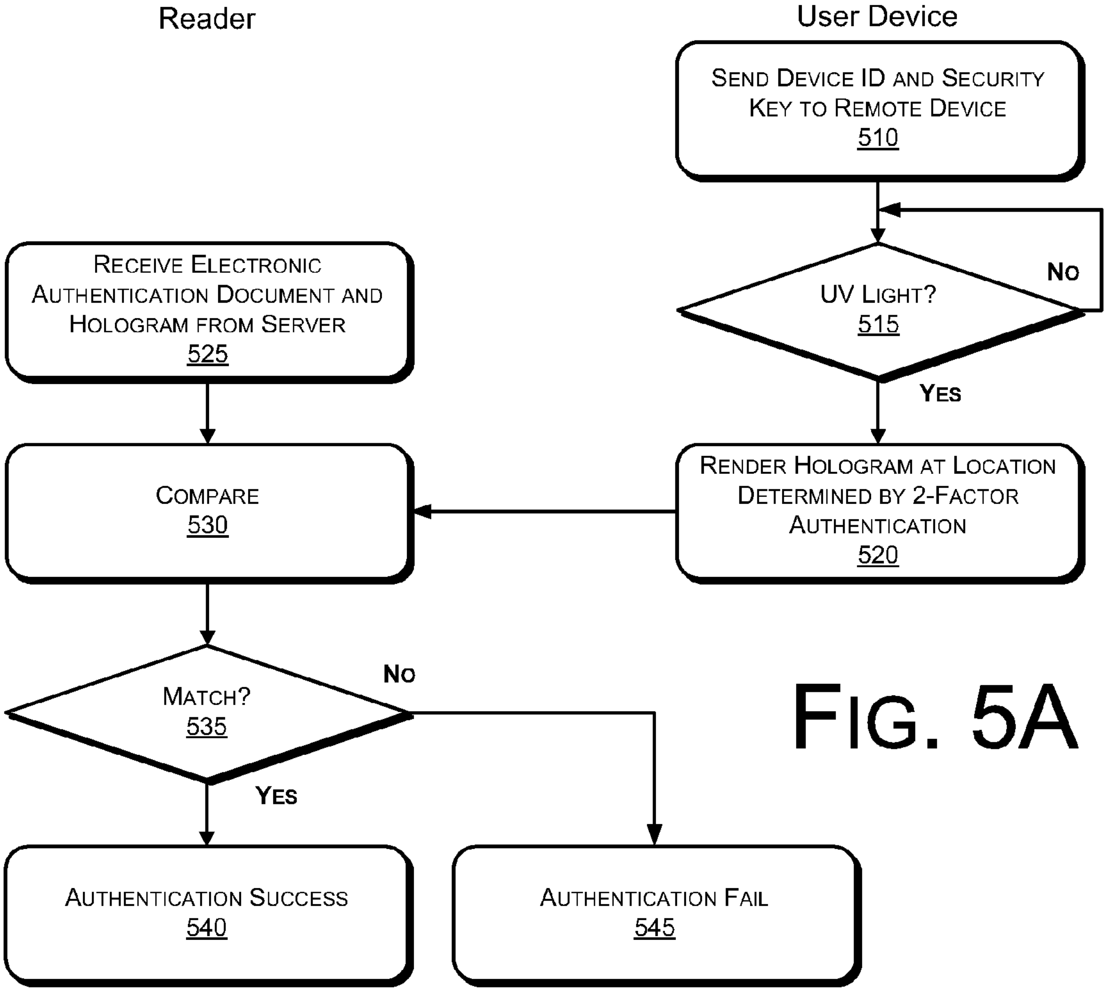

Reader
User Device
Send Device ID and Security Key to Remote Device 510
UV Light? 515
No
Yes
Receive Electronic Authentication Document and Hologram from Server 525
Render Hologram at Location Determined by 2-Factor Authentication 520
Compare 530
Match? 535
No
Yes
Authentication Success 540
Authentication Fail 545

FIG. 5A

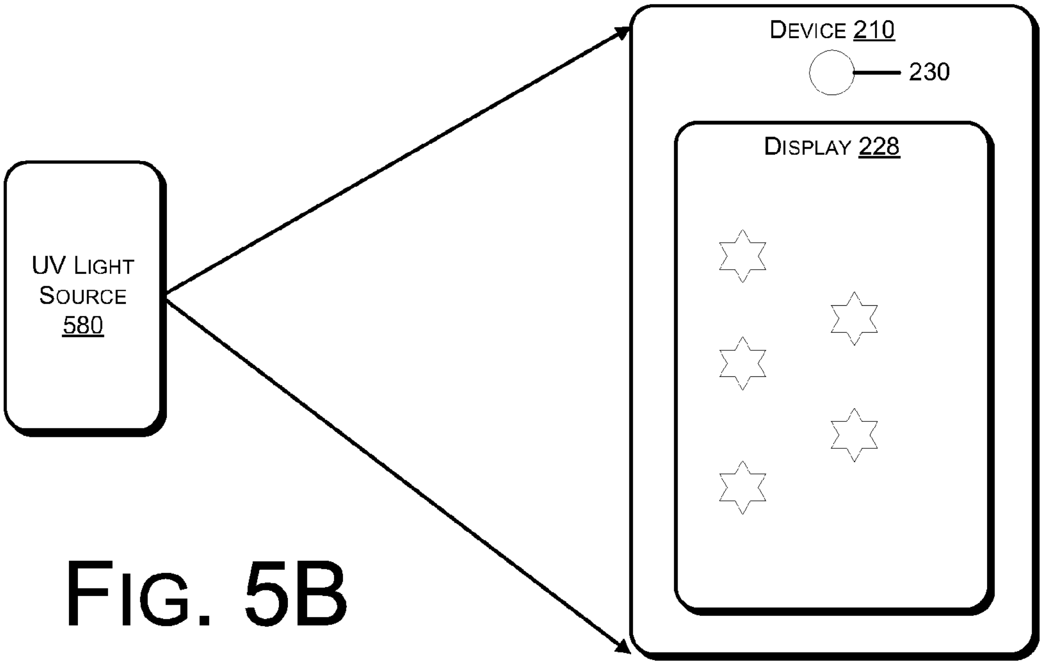

Device 210
230
Display 228
UV Light Source 580

FIG. 5B

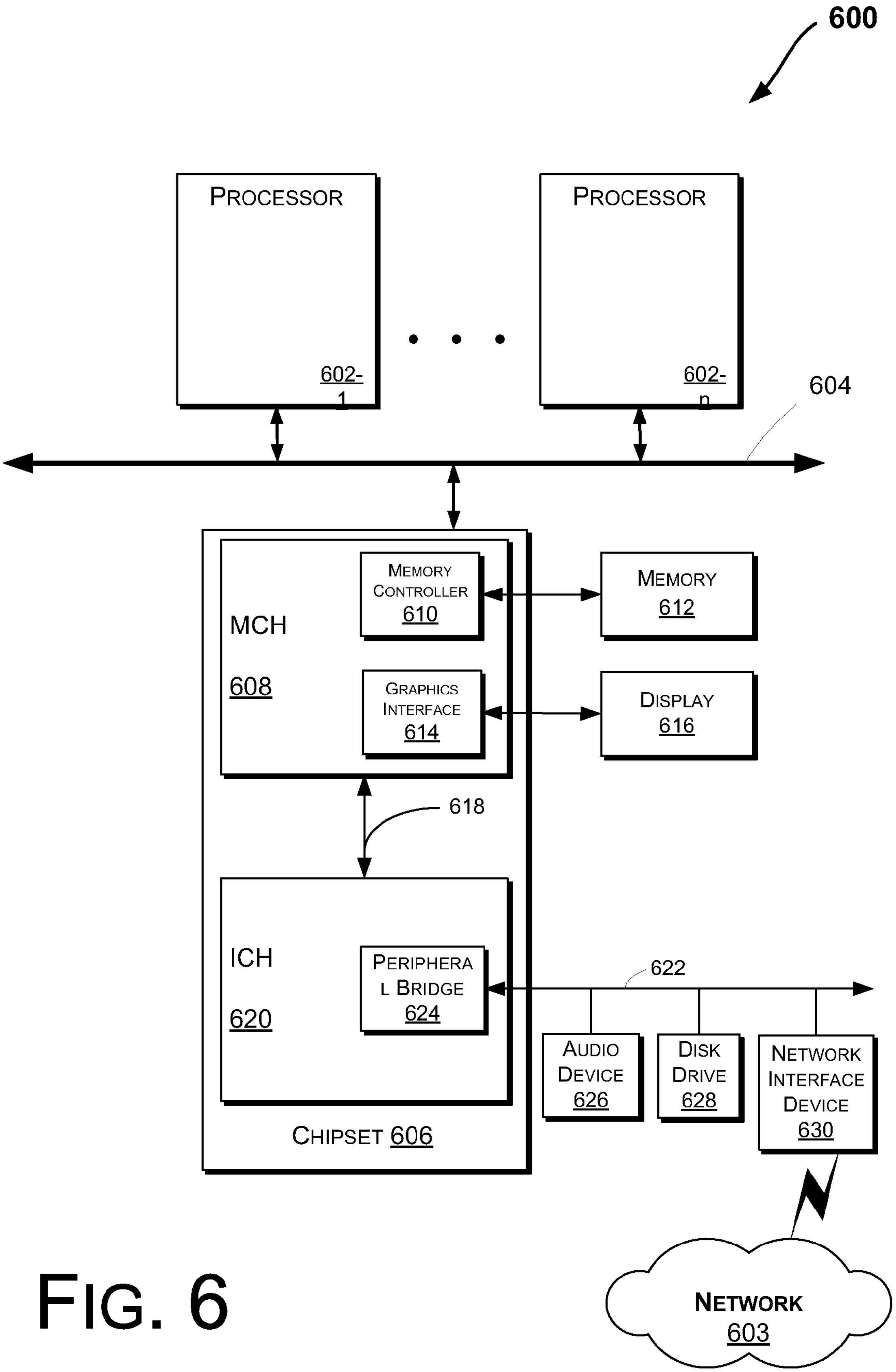

600
PROCESSOR
602-1
PROCESSOR
602-n
604
MEMORY CONTROLLER 610
MCH
608
GRAPHICS INTERFACE 614
MEMORY 612
DISPLAY 616
618
ICH
620
PERIPHERAL BRIDGE 624
622
AUDIO DEVICE 626
DISK DRIVE 628
NETWORK INTERFACE DEVICE 630
CHIPSET 606
NETWORK 603

FIG. 6

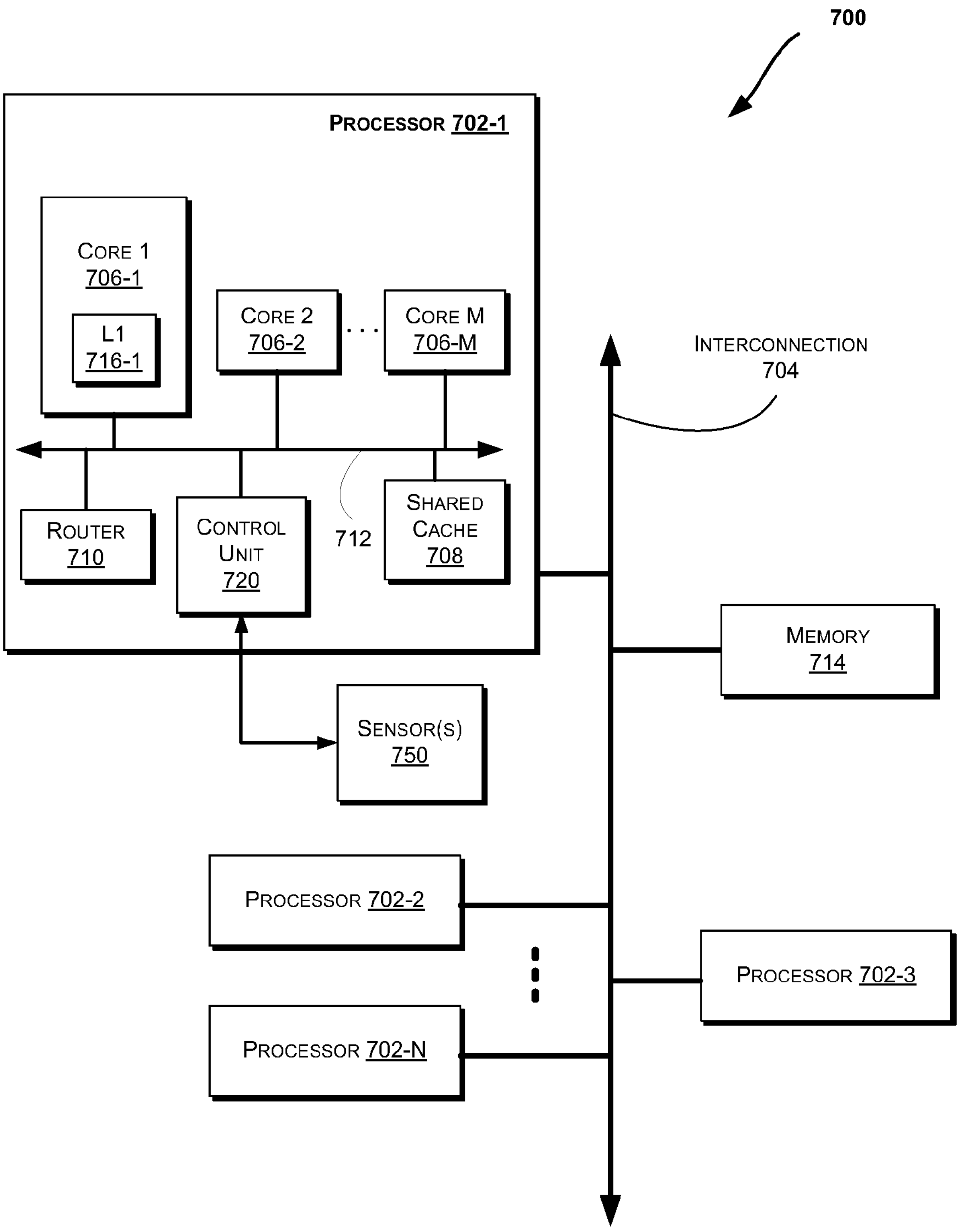

700
PROCESSOR 702-1
CORE 1
706-1
L1
716-1
CORE 2
706-2
CORE M
706-M
ROUTER
710
CONTROL
UNIT
720
712
SHARED
CACHE
708
INTERCONNECTION
704
MEMORY
714
SENSOR(S)
750
PROCESSOR 702-2
PROCESSOR 702-3
PROCESSOR 702-N

FIG. 7

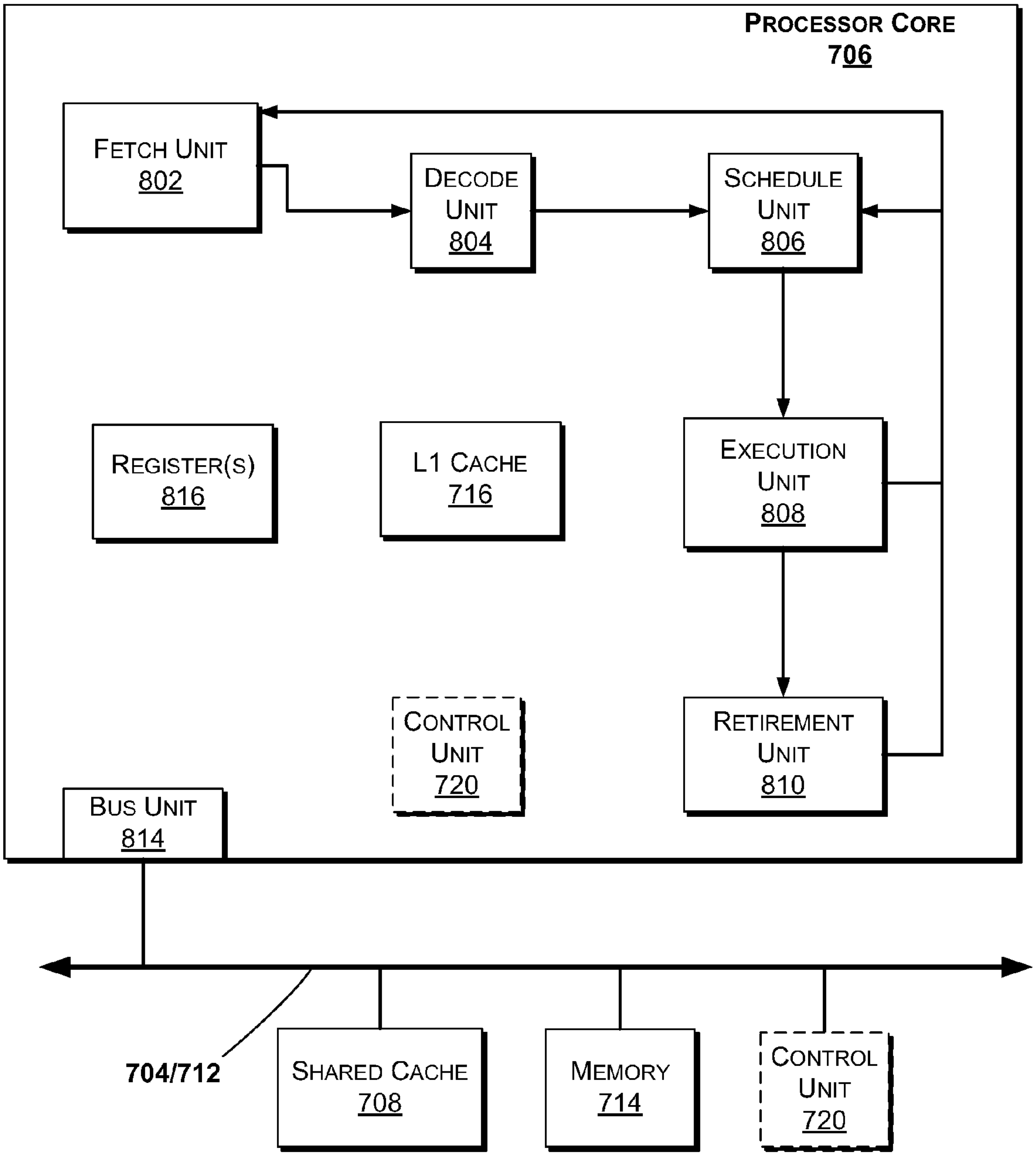

PROCESSOR CORE
706
FETCH UNIT
802
DECODE UNIT
804
SCHEDULE UNIT
806
REGISTER(S)
816
L1 CACHE
716
EXECUTION UNIT
808
CONTROL UNIT
720
RETIREMENT UNIT
810
BUS UNIT
814
704/712
SHARED CACHE
708
MEMORY
714
CONTROL UNIT
720

FIG. 8

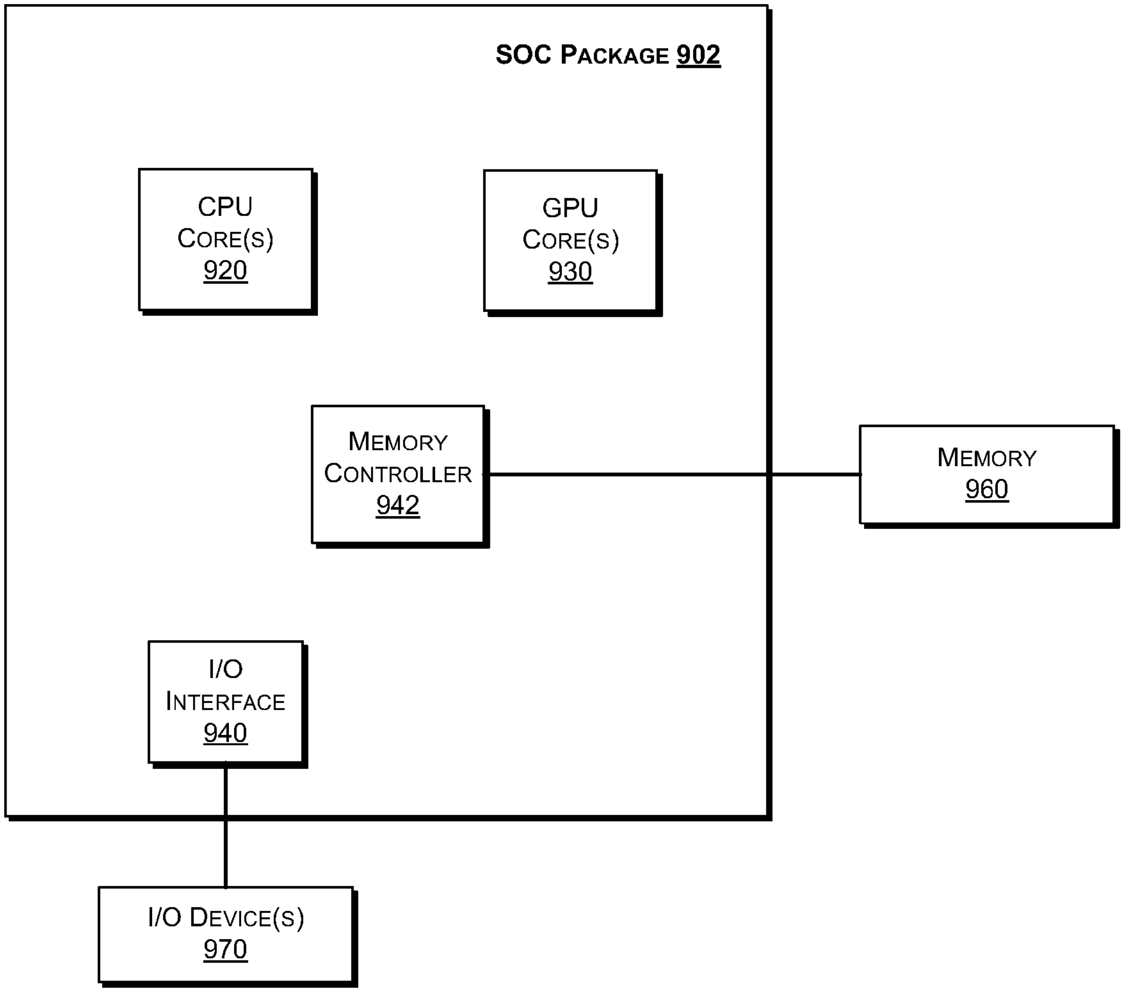

SOC PACKAGE 902
CPU CORE(S) 920
GPU CORE(S) 930
MEMORY CONTROLLER 942
MEMORY 960
I/O INTERFACE 940
I/O DEVICE(S) 970

FIG. 9

ELECTRONIC AUTHENTICATION DOCUMENT SYSTEM AND METHOD

RELATED APPLICATIONS

None.

BACKGROUND

The subject matter described herein relates generally to the field of electronic devices and more particularly to an electronic authentication document system and method which may be implemented using electronic devices.

In common practice people carry physical authentication documents such as passports, driver's licenses, identification cards, etc. Such physical authentication documents can be bulky, duplicative, and may be subject to forgery, mutilation, and deterioration over time. Accordingly systems and techniques to provide an electronic authentication document system and method which may be implemented using electronic devices may find utility.

BRIEF DESCRIPTION OF THE DRAWINGS

The detailed description is described with reference to the accompanying figures.

FIGS. **1-2** are schematic illustrations of exemplary electronic devices which may be adapted to implement an electronic authentication document system and method in accordance with some embodiments.

FIGS. **3-5**A are flowcharts illustrating operations in a method to implement an electronic authentication document system and method in accordance with some embodiments.

FIG. **5**B is a schematic illustration of an operating environment for an electronic authentication document system and method in accordance with some embodiments

FIGS. **6-9** are schematic illustrations of exemplary electronic devices which may be adapted to implement an electronic authentication document system and method in accordance with some embodiments.

DETAILED DESCRIPTION

Described herein are exemplary systems and methods to implement an electronic authentication document system and method in electronic devices. In the following description, numerous specific details are set forth to provide a thorough understanding of various embodiments. However, it will be understood by those skilled in the art that the various embodiments may be practiced without the specific details. In other instances, well-known methods, procedures, components, and circuits have not been illustrated or described in detail so as not to obscure the particular embodiments.

FIG. **1** is a schematic illustration of an exemplary system **100** which may be adapted to implement an electronic authentication document system and method in accordance with some embodiments. In one embodiment, system **100** includes an electronic device **108** and one or more accompanying input/output devices including a display **102** having a screen **104**, one or more speakers **106**, a keyboard **110**, one or more other I/O device(s) **112**, and a mouse **114**. The other I/O device(s) **112** may include a touch screen, a voice-activated input device, a track ball, a geolocation device, an accelerometer/gyroscope and any other device that allows the system **100** to receive input from a user.

In various embodiments, the electronic device **108** may be embodied as a personal computer, a laptop computer, a personal digital assistant, a mobile telephone, an entertainment device, or another computing device. The electronic device **108** includes system hardware **120** and memory **130**, which may be implemented as random access memory and/or read-only memory. A file store **180** may be communicatively coupled to computing device **108**. File store **180** may be internal to computing device **108** such as, e.g., one or more hard drives, CD-ROM drives, DVD-ROM drives, or other types of storage devices. File store **180** may also be external to computer **108** such as, e.g., one or more external hard drives, network attached storage, or a separate storage network.

System hardware **120** may include one or more processors **122**, graphics processors **124**, network interfaces **126**, and bus structures **128**. In one embodiment, processor **122** may be embodied as an Intel® Core2 Duo® processor available from Intel Corporation, Santa Clara, Calif., USA. As used herein, the term "processor" means any type of computational element, such as but not limited to, a microprocessor, a microcontroller, a complex instruction set computing (CISC) microprocessor, a reduced instruction set (RISC) microprocessor, a very long instruction word (VLIW) microprocessor, or any other type of processor or processing circuit.

Graphics processor(s) **124** may function as adjunct processor that manages graphics and/or video operations. Graphics processor(s) **124** may be integrated into the packaging of processor(s) **122**, onto the motherboard of computing system **100** or may be coupled via an expansion slot on the motherboard.

In one embodiment, network interface **126** could be a wired interface such as an Ethernet interface (see, e.g., Institute of Electrical and Electronics Engineers/IEEE 802.3-2002) or a wireless interface such as an IEEE 802.11a, b or g-compliant interface (see, e.g., IEEE Standard for IT-Telecommunications and information exchange between systems LAN/MAN—Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications Amendment 4: Further Higher Data Rate Extension in the 2.4 GHz Band, 802.11G-2003). Another example of a wireless interface would be a general packet radio service (GPRS) interface (see, e.g., Guidelines on GPRS Handset Requirements, Global System for Mobile Communications/GSM Association, Ver. 3.0.1, December 2002).

Bus structures **128** connect various components of system hardware **128**. In one embodiment, bus structures **128** may be one or more of several types of bus structure(s) including a memory bus, a peripheral bus or external bus, and/or a local bus using any variety of available bus architectures including, but not limited to, 11-bit bus, Industrial Standard Architecture (ISA), Micro-Channel Architecture (MSA), Extended ISA (EISA), Intelligent Drive Electronics (IDE), VESA Local Bus (VLB), Peripheral Component Interconnect (PCI), Universal Serial Bus (USB), Advanced Graphics Port (AGP), Personal Computer Memory Card International Association bus (PCMCIA), and Small Computer Systems Interface (SCSI).

Memory **130** may include an operating system **140** for managing operations of computing device **108**. In one embodiment, operating system **140** includes a hardware interface module **154** that provides an interface to system hardware **120**. In addition, operating system **140** may include a file system **150** that manages files used in the operation of computing device **108** and a process control subsystem **152** that manages processes executing on computing device **108**.

Operating system **140** may include (or manage) one or more communication interfaces that may operate in conjunction with system hardware **120** to transceive data packets and/or data streams from a remote source. Operating system **140** may further include a system call interface module **142** that provides an interface between the operating system **140** and one or more application modules resident in memory **130**. Operating system **140** may be embodied as a UNIX operating system or any derivative thereof (e.g., Linux, Solaris, etc.) or as a Windows® brand operating system, or other operating systems.

In some embodiments system **100** may comprise a low-power embedded processor, referred to herein as a trusted execution complex **170**. The trusted execution complex **170** may be implemented as an independent integrated circuit located on the motherboard of the system **100**. In the embodiment depicted in FIG. **1** the trusted execution complex **170** comprises a processor **172**, a memory module **174**, an authentication module **176**, an I/O module **178**, and a secure sprite generator **179**. In some embodiments the memory module **164** may comprise a persistent flash memory module and the authentication module **174** may be implemented as logic instructions encoded in the persistent memory module, e.g., firmware or software. The I/O module **178** may comprise a serial I/O module or a parallel I/O module. Because the trusted execution complex **170** is physically separate from the main processor(s) **122** and operating system **140**, the trusted execution complex **170** may be made secure, i.e., inaccessible to hackers such that it cannot be tampered with. The secure sprite generator **179** may generate and present an input/output window on a display of the electronic device.

FIG. **2** is a schematic illustration of another embodiment of an electronic device **210** which may be adapted to implement secure image authentication, according to embodiments. In some embodiments electronic device **210** may be embodied as a mobile telephone, a personal digital assistant (PDA), a laptop computer, or the like. Electronic device **210** may include an RF transceiver **220** to transceive RF signals and a signal processing module **222** to process signals received by RF transceiver **220**.

RF transceiver **220** may implement a local wireless connection via a protocol such as, e.g., Bluetooth or 802.11X. IEEE 802.11a, b or g-compliant interface (see, e.g., IEEE Standard for IT-Telecommunications and information exchange between systems LAN/MAN—Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications Amendment 4: Further Higher Data Rate Extension in the 2.4 GHz Band, 802.11G-2003). Another example of a wireless interface would be a general packet radio service (GPRS) interface (see, e.g., Guidelines on GPRS Handset Requirements, Global System for Mobile Communications/GSM Association, Ver. 3.0.1, December 2002).

Electronic device **210** may further include one or more processors **224** and a memory module **240**. As used herein, the term "processor" means any type of computational element, such as but not limited to, a microprocessor, a microcontroller, a complex instruction set computing (CISC) microprocessor, a reduced instruction set (RISC) microprocessor, a very long instruction word (VLIW) microprocessor, or any other type of processor or processing circuit. In some embodiments, processor **224** may be one or more processors in the family of Intel® PXA27x processors available from Intel® Corporation of Santa Clara, Calif. Alternatively, other CPUs may be used, such as Intel's Itanium®, XEON™ ATOM™, and Celeron® processors. Also, one or more processors from other manufactures may be utilized. Moreover, the processors may have a single or multi core design. In some embodiments, memory module **240** includes random access memory (RAM); however, memory module **240** may be implemented using other memory types such as dynamic RAM (DRAM), synchronous DRAM (SDRAM), and the like.

Electronic device **210** may further include one or more input/output interfaces such as, e.g., a keypad **226** and one or more displays **228**. In some embodiments electronic device **210** comprises one or more camera modules **230** and an image signal processor **232**, and speakers **234**.

In some embodiments electronic device **210** may include a trusted execution complex **270** which may be implemented in a manner analogous to that of trusted execution complex **170**, described above. In the embodiment depicted in FIG. **2** the trusted execution complex **270** comprises a processor(s) **272**, a memory module **274**, an authentication module **276**, an I/O module **278**, and a secure sprite generator **279**. In some embodiments the memory module **274** may comprise a persistent flash memory module and the authentication module **276** may be implemented as logic instructions encoded in the persistent memory module, e.g., firmware or software. The I/O module **278** may comprise a serial I/O module or a parallel I/O module. Again, because the trusted execution complex **270** is physically separate from the main processor(s) **224**, the trusted execution complex **270** may be made secure, i.e., inaccessible to hackers such that it cannot be tampered with.

In some embodiments the electronic devices **100**, **210** depicted in FIGS. **1-2**, respectively, may be adapted to implement an electronic authentication document system and method. In the embodiments described herein the respective trusted execution complexes **170**, **270** may be used to implement an electronic authentication document system and method. It will be recognized, however, that the main processors(s) **122**, **224** of the respective electronic devices **100**, **210** may be used to implement an electronic authentication document system and method.

Having described various structures of an electronic authentication document system, operating aspects of a system will be explained with reference to FIGS. **3-5**A, which are flowcharts illustrating operations in a method to implement an electronic authentication document system and method in accordance with some embodiments. In some embodiments the operations depicted in the flowchart of FIGS. **3-5**A may be implemented by the respective authentication module(s) **172**, **272** of the electronic devices **100**, **210**.

By way of overview, in some embodiments a system implements procedures to generate one or more electronic authentication documents which may be stored electronically in a memory of an electronic device such as the electronic devices depicted in FIGS. **1-2**. Corresponding copies of, or at least information relating to, the authentication documents may be stored in one or more memory devices coupled to a communication network. When a holder of an electronic authentication document presents the document for validation the electronic device may cooperate with one or more remote electronic devices to implement security procedures to authenticate the electronic authentication document.

FIG. **3** is a flowchart which illustrates operations implemented during a method to generate an electronic authentication document, according to embodiments. By way of example, an electronic authentication document may be generated by a remote service provider which operates one or more authentication servers which may be coupled to a user electronic device by a suitable communication network, e.g., the Internet.

Referring to FIG. **3**, at operation **310** the authentication server receives a request for an electronic authentication document. By way of example, in some embodiments a user of an electronic device may generate a request for an electronic authentication document via an application which executes on the authentication server. In some embodiments the authentication server may collect information which may be used to authenticate the user including, e.g., photographic identification, personal identification information, etc. The authentication server may also collect information which may be used to authenticate the user's electronic device, e.g., the device International Mobile Station Equipment Identity (IMEI) number, device serial number, and device phone number, etc.

In some embodiments a user may provide biometric data with the request. By way of example, in some embodiments a user may be required to provide a fingerprint, retina scan, voice print, or other biometric data with the request. Biometric data may be acquired by the user's electronic device or may be acquired remotely through kiosks or device based remote biometric credential authentication like remote fingerprinting. The authentication server receives (operation **315**) the biometric data from the user. The user request and associated information are stored in a file store **380**, e.g., a database or other memory structure coupled to the authentication server.

At operation **320** the authentication server generates a device-specific authentication document, which is stored in the file store **380**. In some embodiments the electronic authentication document may be embodied as an application which may be installed on the electronic device. The electronic authentication document application may include one or more device identifiers such as the identifiers provided by the user with the request. The device identifiers uniquely identify the electronic device on which the electronic authentication document will be stored. Thus, the electronic authentication document will have a 1:1 correlation with a particular device.

The electronic authentication document application may include a 2-factor authentication algorithm logic module. When executed by a processor on the electronic device the 2-factor authentication logic may require the user to enter a password and 2 factor logic synchronizes with the server to generate a unique code or pattern associated with the electronic authentication document each time the document is opened. The pattern can be visible or invisible.

The electronic authentication document application may include a hologram creation logic module. When executed by a processor on the electronic device the hologram creation logic module may detect a signal and in response to the signal may create LCD pixel colors to generate images which will look like holographic patterns. By way of example, in some embodiments the hologram creation logic module may interface with a camera of an electronic device to detect when the electronic device is exposed to light of a specific wavelength (e.g., UV light) or light which flashes with a specific pattern. In alternate embodiments the hologram creation logic module may interface with a wireless communication capability of the electronic device (e.g., a wireless adapter or a near filed controller NFC)) to detect a signal. In alternate embodiments the hologram creation logic module may interface with in input/output device such as a keyboard or a touch screen to detect a specific input code. The particular interface(s) or signal(s) are not critical.

The electronic authentication document application may include at least portions of the authentication information supplied by the user in operations **310** and **315**, e.g., a photograph, personal identification information, and biometric data.

At operation **325** the authentication server sends the authentication document to the user's electronic device. By way of example, the authentication document may be transmitted to the user's device via a suitable communication link, e.g., by a wireless or wired link, or by a suitable communication network, e.g., the Internet or a private network. The specific transmission medium is not critical.

At operation **330** the user's electronic device receives the electronic authentication document, and at operation **335** the electronic authentication document is installed as an application on the device. During the installation process the 2-factor authentication algorithm logic module is invoked and prompts the user to enter a password. The authentication algorithm will then generate (operation **340**) a security key for the electronic authentication document, which is synchronized with a corresponding security key on the authentication server. The security key can be keyboard character based or design pattern based. In addition, a computer readable code may be associated with the electronic authentication document. By way of example, the computer readable code may comprise one or more of a bar code, a bit pattern, a screen image, or any other computer readable code.

At operation **345** the user's electronic device stores the electronic authentication document and the associated computer readable code in a memory of the electronic device. Referring back to FIGS. **1-2**, in some embodiments the electronic authentication document may be stored in a memory in the trusted execution complex such that the document is not subject to being snooped or tampered by applications which execute on the main processor(s) of the electronic device.

Once the electronic authentication document is stored on the user's electronic device there are multiple ways in which the electronic authentication document can be accessed. By way of example, the electronic authentication document may be accessed by a near field communication (NFC) link, a dock connection through a connector port, e.g., a universal serial bus (USB) connector, a personal area network (PAN), e.g., via a standard Bluetooth connection or an Infrared connection, or a WiFi connection.

FIG. **4** is a flowchart which illustrates operations implemented during a method to access an electronic authentication document, according to embodiments. By way of example, an electronic authentication document may be accessed in response to a request generated (operation **410**) by a remote device such as an electronic document reader. In alternate embodiments a user may generate a request via the secure sprite generator **179**/**279**. The specific origin of the access request is not critical. The remote device may be integrated with or communicatively coupled to the authentication server depicted in FIG. **3**.

The user electronic device receives the access request (operation **415**) and retrieves (operation **420**) one or more of the device identifiers which uniquely identify the electronic device, e.g., the IMEI, serial number, and/or phone number. At operation **425** the 2-factor authentication algorithm logic module is invoked to generate a unique security key, which is sent (operation **430**) to the remote device at operation **430**. Optionally, the user electronic device may transmit personal identifier data with the device identifier and the security key.

At operation **435** the remote device receives the device identifier and the security key from the user electronic device. At operation **440** the remote device compares the security key and device and/or personal identifier(s) received from the user electronic device with the security key and device and/or personal identifier(s) stored in the file store **380** coupled to the authentication server depicted in FIG. **3**. If, at operation **445**, the credentials and security key match then the authentication is deemed successful. By contrast, if at operation **445** the credentials and security key do not match then the authentication is deemed unsuccessful.

In some embodiments the authentication procedure may comprise presenting an image of the electronic authentication document on a display device of the user's electronic device for inspection. The inspection may be a visual inspection by a human or an automated inspection process implemented by an electronic reader device. Further, in some embodiments the user electronic device may be configured to present an image, e.g., a holographic image or other image, on the display. Various image characteristics such as the depiction of the image, location of image components, color schemes, etc., may be determined as a function of an output of the 2-factor authentication logic algorithm. This enables the user electronic device to generate a unique image each time the device is activated. In addition, the authentication server may generate a corresponding image as a function of the output of the 2-factor authentication logic algorithm. Comparing the images allows for an additional authentication capability.

FIG. **5**A is a flowchart which illustrates operations implemented during a method to present an image on the display in or to facilitate authentication of an electronic authentication document, according to embodiments. FIG. **5**B is a schematic illustration of an operating environment for an electronic authentication document system and method in accordance with some embodiments. In the embodiment depicted in FIGS. **5**A and **5**B, the hologram creation logic module of the electronic authentication document application configures the user device to present an image in response to the detection of a UV light directed at the electronic device. The operations of FIG. **5**A may be performed as part of the access process depicted in FIG. **4**.

Referring to FIG. **5**A, at operation **510** the user electronic device sends one or more device identifiers and an authentication code to a remote device, e.g., an authentication server. At operation **515** the user device monitors the environment to determine whether the device is being exposed to UV light. By way of example, referring to FIG. **5**B, in some embodiments the user electronic device **210** may be presented to a card reader which projects UV light from a light source **580** onto the user electronic device **210**. The UV light may be detected by an image capture device **230** of the user electronic device **210**. As described above, in alternate embodiments the reader may generate a signal using a different medium, e.g., a radio signal or the like.

If, at operation **515**, the user device **210** detects that the device **210** is being exposed to UV light then the user device **210** renders a holographic pattern on the display **228** which has at least one characteristic that is determined by an output of the 2-factor authentication algorithm. By way of example, in some embodiments a location of the holographic pattern may be determined by an output of the 2-factor authentication algorithm. The hologram may be visible only in response to UV light. The holographic image may be presented on the display of the user electronic device in combination with the electronic authentication document.

In some embodiments the authentication server executes corresponding hologram creation logic to generate a holographic image using an output of the 2-factor authentication logic algorithm. The authentication server may send a copy of the electronic authentication document and the holographic image to the reader for presentation on a display coupled to or proximate the reader.

At operation **530** the image on the user electronic device **210** and the image presented on a display coupled to or proximate the reader are compared. The comparison may be performed manually or may be performed by logic executing on the reader. If, at operation **535**, the images match then a copy of the electronic authentication document and the holographic pattern match then the authentication is deemed successful. By contrast, if at operation **445** the authentication document and the holographic pattern do not match then the authentication is deemed unsuccessful.

Thus, there is described herein an electronic authentication document system and method through which authentication documents, which have traditionally been stored in a physical form, may be stored in electronic form on a user electronic device. Forging, piracy and image duplication may be inhibited using a layered security process.

Level 1 security includes a facial photograph validation on the electronic authentication document. Level 1 security provides basic protection against document misuse in case of a stolen device.

Level 2 security includes validating a **1**:**1** correlation between the electronic device and the authentication document during installation and authentication. Level 2 security inhibits the distribution and installation of the document to users and devices who are not the intended recipients. By maintaining a **1**:**1** correlation between the document and the device inhibits the installation and authentication of a tampered document and forgery will be eliminated to a great extent. In the embodiments described herein this may be implemented using the IMEI Number, Phone # and Device Serial #.

Registration of device specific details like IMEI Number or Phone # or Device Serial # or a combination of these with the service provider may be required requirement before the electronic authentication document can be downloaded to the device. A user enters one or more credentials like Name, address and other personal details along with his IMEI Number or Phone # or Device Serial # or a combination of these.

During the validity period of the document if a user decides to change or upgrade his device, the user can then download a copy of the same document into a new device by providing the new device id and by following the authentication process described in the document generation section. Even if installation of a tampered document succeeds, during document access and authentication the device id in form of IMEI Number or Phone # or Device Serial # or a combination of these may be cross verified with the information originally submitted during registration. This will immediately show that the document is not being accessed from the device it was intended for.

Level 3 Security includes 2-factor authentication, which protects against attacks which can override Level 1 and Level 2 security checks. The 2-factor authentication algorithm returns a unique code which may be used to generate a unique visible or invisible pattern on the device every time the electronic authentication document is launched. The pattern can consist of a unique internal code, unique shapes, numbers or characters or a combination of these. The 2 factor authentication will be used in case of no visual and visual authentication process as explained earlier.

As described above, the electronic authentication document is installed on the device with a 2 factor authentication algorithm. As part of this algorithm the user will enter a single password while installing the and the second token based authentication is already inbuilt into the application. The unique combination of the user password and token authentication may be used to generate a unique visible or invisible pattern on the device every time the application is launched. The pattern can consist of a unique internal code, unique shapes, numbers or characters or a combination of these.

These can be matched internally within the system or even visually. The document may be considered authenticated if the codes/patters generated by the device and the service provider computer match.

Level 4 Security may comprise a biometric matching process. In some embodiments a user's biometric data may be captured during the first interaction with the authentication server and stored in association within the electronic authentication document at the authentication server. This biometric information of the user stored in the document will be compared with the actual biometric information gathered on site during authentication. Using a multilayered security approach will make it extremely difficult to duplicate the document since the document will be unique to a single device using device identity and will also be unique to a single user using biometric information.

If the device is lost or stolen the electronic authentication document is protected against misuse by the device's standard security processes like logon password, remote wipe and hard disk encryption. Also when the user reregisters the document the two factor authentication logic will resynchronize the pattern so even if the stolen documents are accessed in a verifying system the two factor authentication algorithms will fail and will return a particular pattern or code indicating that this is a stolen or an invalid document.

As described above, in some embodiments the electronic device may be embodied as a computer system. FIG. **6** illustrates a block diagram of a computing system **600** in accordance with an embodiment of the invention. The computing system **600** may include one or more central processing unit(s) (CPUs) **602** or processors that communicate via an interconnection network (or bus) **604**. The processors **602** may include a general purpose processor, a network processor (that processes data communicated over a computer network **603**), or other types of a processor (including a reduced instruction set computer (RISC) processor or a complex instruction set computer (CISC)). Moreover, the processors **602** may have a single or multiple core design. The processors **602** with a multiple core design may integrate different types of processor cores on the same integrated circuit (IC) die. Also, the processors **602** with a multiple core design may be implemented as symmetrical or asymmetrical multiprocessors. In an embodiment, one or more of the processors **602** may be the same or similar to the processors **102** of FIG. **1**. For example, one or more of the processors **602** may include the control unit **120** discussed with reference to FIGS. **1-3**. Also, the operations discussed with reference to FIGS. **3-5** may be performed by one or more components of the system **600**.

A chipset **606** may also communicate with the interconnection network **604**. The chipset **606** may include a memory control hub (MCH) **608**. The MCH **608** may include a memory controller **610** that communicates with a memory **612** (which may be the same or similar to the memory **130** of FIG. **1**). The memory **412** may store data, including sequences of instructions, that may be executed by the CPU **602**, or any other device included in the computing system **600**. In one embodiment of the invention, the memory **612** may include one or more volatile storage (or memory) devices such as random access memory (RAM), dynamic RAM (DRAM), synchronous DRAM (SDRAM), static RAM (SRAM), or other types of storage devices. Nonvolatile memory may also be utilized such as a hard disk. Additional devices may communicate via the interconnection network **604**, such as multiple CPUs and/or multiple system memories.

The MCH **608** may also include a graphics interface **614** that communicates with a display device **616**. In one embodiment of the invention, the graphics interface **614** may communicate with the display device **616** via an accelerated graphics port (AGP). In an embodiment of the invention, the display **616** (such as a flat panel display) may communicate with the graphics interface **614** through, for example, a signal converter that translates a digital representation of an image stored in a storage device such as video memory or system memory into display signals that are interpreted and displayed by the display **616**. The display signals produced by the display device may pass through various control devices before being interpreted by and subsequently displayed on the display **616**.

A hub interface **618** may allow the MCH **608** and an input/output control hub (ICH) **620** to communicate. The ICH **620** may provide an interface to I/O device(s) that communicate with the computing system **600**. The ICH **620** may communicate with a bus **622** through a peripheral bridge (or controller) **624**, such as a peripheral component interconnect (PCI) bridge, a universal serial bus (USB) controller, or other types of peripheral bridges or controllers. The bridge **624** may provide a data path between the CPU **602** and peripheral devices. Other types of topologies may be utilized. Also, multiple buses may communicate with the ICH **620**, e.g., through multiple bridges or controllers. Moreover, other peripherals in communication with the ICH **620** may include, in various embodiments of the invention, integrated drive electronics (IDE) or small computer system interface (SCSI) hard drive(s), USB port(s), a keyboard, a mouse, parallel port(s), serial port(s), floppy disk drive(s), digital output support (e.g., digital video interface (DVI)), or other devices.

The bus **622** may communicate with an audio device **626**, one or more disk drive(s) **628**, and a network interface device **630** (which is in communication with the computer network **603**). Other devices may communicate via the bus **622**. Also, various components (such as the network interface device **630**) may communicate with the MCH **608** in some embodiments of the invention. In addition, the processor **602** and one or more other components discussed herein may be combined to form a single chip (e.g., to provide a System on Chip (SOC)). Furthermore, the graphics accelerator **616** may be included within the MCH **608** in other embodiments of the invention.

Furthermore, the computing system **600** may include volatile and/or nonvolatile memory (or storage). For example, nonvolatile memory may include one or more of the following: read-only memory (ROM), programmable ROM (PROM), erasable PROM (EPROM), electrically EPROM (EEPROM), a disk drive (e.g., **628**), a floppy disk, a compact disk ROM (CD-ROM), a digital versatile disk (DVD), flash memory, a magneto-optical disk, or other types of nonvolatile machine-readable media that are capable of storing electronic data (e.g., including instructions).

FIG. **7** illustrates a block diagram of a computing system **700**, according to an embodiment of the invention. The system **700** may include one or more processors **702-1** through **702**-N (generally referred to herein as "processors **702**" or "processor **702**"). The processors **702** may communicate via an interconnection network or bus **704**. Each processor may include various components some of which are only discussed with reference to processor **702-1** for clarity. Accordingly, each of the remaining processors **702-2** through **702**-N may include the same or similar components discussed with reference to the processor **702-1**.

In an embodiment, the processor **702-1** may include one or more processor cores **706-1** through **706**-M (referred to herein as "cores **706**" or more generally as "core **706**"), a shared cache **708**, a router **710**, and/or a processor control logic or unit **720**. The processor cores **706** may be implemented on a single integrated circuit (IC) chip. Moreover, the chip may include one or more shared and/or private caches (such as cache **708**), buses or interconnections (such as a bus or interconnection network **712**), memory controllers, or other components.

In one embodiment, the router **710** may be used to communicate between various components of the processor **702-1** and/or system **700**. Moreover, the processor **702-1** may include more than one router **710**. Furthermore, the multitude of routers **710** may be in communication to enable data routing between various components inside or outside of the processor **702-1**.

The shared cache **708** may store data (e.g., including instructions) that are utilized by one or more components of the processor **702-1**, such as the cores **706**. For example, the shared cache **708** may locally cache data stored in a memory **714** for faster access by components of the processor **702**. In an embodiment, the cache **708** may include a mid-level cache (such as a level 2 (L2), a level 3 (L3), a level 4 (L4), or other levels of cache), a last level cache (LLC), and/or combinations thereof. Moreover, various components of the processor **702-1** may communicate with the shared cache **708** directly, through a bus (e.g., the bus **712**), and/or a memory controller or hub. As shown in FIG. **7**, in some embodiments, one or more of the cores **706** may include a level 1 (L1) cache **716-1** (generally referred to herein as "L1 cache **716**"). In one embodiment, the controller **720** may include logic to implement the operations described above with reference to FIG. **3**.

FIG. **8** illustrates a block diagram of portions of a processor core **706** and other components of a computing system, according to an embodiment of the invention. In one embodiment, the arrows shown in FIG. **8** illustrate the flow direction of instructions through the core **706**. One or more processor cores (such as the processor core **706**) may be implemented on a single integrated circuit chip (or die) such as discussed with reference to FIG. **7**. Moreover, the chip may include one or more shared and/or private caches (e.g., cache **708** of FIG. **7**), interconnections (e.g., interconnections **704** and/or **112** of FIG. **7**), control units, memory controllers, or other components.

As illustrated in FIG. **8**, the processor core **706** may include a fetch unit **802** to fetch instructions (including instructions with conditional branches) for execution by the core **706**. The instructions may be fetched from any storage devices such as the memory **714**. The core **706** may also include a decode unit **804** to decode the fetched instruction. For instance, the decode unit **804** may decode the fetched instruction into a plurality of uops (micro-operations).

Additionally, the core **706** may include a schedule unit **806**. The schedule unit **806** may perform various operations associated with storing decoded instructions (e.g., received from the decode unit **804**) until the instructions are ready for dispatch, e.g., until all source values of a decoded instruction become available. In one embodiment, the schedule unit **806** may schedule and/or issue (or dispatch) decoded instructions to an execution unit **808** for execution. The execution unit **808** may execute the dispatched instructions after they are decoded (e.g., by the decode unit **804**) and dispatched (e.g., by the schedule unit **806**). In an embodiment, the execution unit **808** may include more than one execution unit. The execution unit **808** may also perform various arithmetic operations such as addition, subtraction, multiplication, and/or division, and may include one or more an arithmetic logic

units (ALUs). In an embodiment, a co-processor (not shown) may perform various arithmetic operations in conjunction with the execution unit **808**.

Further, the execution unit **808** may execute instructions out-of-order. Hence, the processor core **706** may be an out-of-order processor core in one embodiment. The core **706** may also include a retirement unit **810**. The retirement unit **810** may retire executed instructions after they are committed. In an embodiment, retirement of the executed instructions may result in processor state being committed from the execution of the instructions, physical registers used by the instructions being de-allocated, etc.

The core **706** may also include a bus unit **714** to enable communication between components of the processor core **706** and other components (such as the components discussed with reference to FIG. **8**) via one or more buses (e.g., buses **804** and/or **812**). The core **706** may also include one or more registers **816** to store data accessed by various components of the core **706** (such as values related to power consumption state settings).

Furthermore, even though FIG. **7** illustrates the control unit **720** to be coupled to the core **706** via interconnect **812**, in various embodiments the control unit **720** may be located elsewhere such as inside the core **706**, coupled to the core via bus **704**, etc.

In some embodiments, one or more of the components discussed herein can be embodied as a System On Chip (SOC) device. FIG. **9** illustrates a block diagram of an SOC package in accordance with an embodiment. As illustrated in FIG. **9**, SOC **902** includes one or more Central Processing Unit (CPU) cores **920**, one or more Graphics Processor Unit (GPU) cores **930**, an Input/Output (I/O) interface **940**, and a memory controller **942**. Various components of the SOC package **902** may be coupled to an interconnect or bus such as discussed herein with reference to the other figures. Also, the SOC package **902** may include more or less components, such as those discussed herein with reference to the other figures. Further, each component of the SOC package **902** may include one or more other components, e.g., as discussed with reference to the other figures herein. In one embodiment, SOC package **902** (and its components) is provided on one or more Integrated Circuit (IC) die, e.g., which are packaged into a single semiconductor device.

As illustrated in FIG. **9**, SOC package **902** is coupled to a memory **960** (which may be similar to or the same as memory discussed herein with reference to the other figures) via the memory controller **942**. In an embodiment, the memory **960** (or a portion of it) can be integrated on the SOC package **902**.

The I/O interface **940** may be coupled to one or more I/O devices **970**, e.g., via an interconnect and/or bus such as discussed herein with reference to other figures. I/O device(s) **970** may include one or more of a keyboard, a mouse, a touchpad, a display, an image/video capture device (such as a camera or camcorder/video recorder), a touch screen, a speaker, or the like.

The following examples pertain to further embodiments.

Example 1 is a controller, comprising logic configured to receive a document copy, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic generate, with the authentication algorithm, a security key for the document copy based on at least one input from the user, transmit the security key to a remote device and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory.

In example 2 the document copy of claim **1** can optionally include at least one of a photograph of a user of the document copy, a credential of the user of the document copy, and a biometric identifier of the user of the document copy.

In example 3 the controller of claim **1** can optionally include logic configured to authenticate the electronic device.

In example 4 the document copy of claim **1** can optionally include the computer-readable code comprises at least one device identifier which uniquely identifies the device and at least one user credential.

In example 5 the controller of claim **1** can optionally include logic that is configured to receive a request to access the document copy, generate an authentication code for the document copy and present an image of the document copy on a display, wherein the image comprises the computer-readable code.

In example 6 the controller of claim **1** can optionally include a hologram logic which, when executed by the controller, configures the controller to detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

In example 7 the controller of claim **1** can optionally include logic is configured to determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

Example 8 is an electronic device comprising a display device, a controller comprising logic configured to receive a document copy, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic, generate, with the authentication algorithm, a security key for the document copy based on at least one input from the user, transmit the security key to a remote device, and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory.

In example 9 the document copy of claim **8** can optionally include at least one of a photograph of a user of the document copy, a credential of the user of the document copy and a biometric identifier of the user of the document copy.

In example 10 the electronic device of claim **8** can optionally include logic is configured to authenticate the electronic device.

In example 11 the computer-readable code of claim **8** the computer-readable code can optionally include at least one device identifier which uniquely identifies the device and at least one user credential.

In example 12 the electronic device of claim **8** can optionally be configured to receive a request to access the document copy, generate an authentication code for the document copy, and present an image of the document copy on a display, wherein the image comprises the computer-readable code.

In example 13 the electronic device of claim **12** can optionally include a hologram logic which, when executed by the controller, configures the controller to detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display,

In example 14 the electronic device of claim **13**, can optionally include logic configured to determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

Example 15 is a computer program product comprising logic instructions stored on a tangible computer readable medium which, when executed by a controller, causes the controller to receive a document copy from a remote device, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic generate, with the authentication algorithm, a security key for the document copy based on at least one input from the user, transmit the security key to a remote device, and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory.

In example 16 the document copy can optionally include at least one of a photograph of a user of the document copy, a credential of the user of the document copy, and a biometric identifier of the user of the document copy.

In example 17 the computer program product of claim **15** can optionally include logic instructions stored on a tangible computer readable medium which, when executed by a controller, cause the controller to authenticate the electronic device.

In example 18 the computer-readable code can optionally include at least one device identifier which uniquely identifies the device and at least one user credential.

In example 19 the computer program product of claim **15** can optionally include logic instructions stored on a tangible computer readable medium which, when executed by a controller, cause the controller to receive a request to access the document copy, generate an authentication code for the document copy; and present an image of the document copy on a display, wherein the image comprises the computer-readable code.

In example 20 the document copy can optionally include a hologram logic which, when executed by the controller, configures the controller to detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

In example 21 the computer program product of claim **20** can optionally include comprising logic instructions stored on a tangible computer readable medium which, when executed by a controller, cause the controller to determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

Example 22 is a processor-based method to manage electronic authentication documents, comprising receiving a document copy, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic, generating, with the authentication algorithm logic, a security key for the document copy based on at least one input from the user, transmitting the security key to a remote processing device, and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory.

In example 23 the document copy can optionally include at least one of a photograph of a user of the document copy, a credential of the user of the document copy, and a biometric identifier of the user of the document copy.

In example 24 the method of claim **22** can optionally include logic configured to authenticate the electronic device.

In example 25 the method of claim **22**, can optionally include logic configured to receive a request to access the document copy, generate an authentication code for the document copy, and present an image of the document copy on a display, wherein the image comprises the computer-readable code.

Example 26 is a controller comprising means to receive a document copy, wherein the document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic, generate, with the authentication algorithm, a security key for the document copy based on at least one input from the user, transmit the security key to a remote device, and store the document copy and a computer-readable code which uniquely associates the document with the electronic device in a memory.

In example 27 the document copy can optionally include at least one of a photograph of a user of the document copy, a credential of the user of the document copy, and a biometric identifier of the user of the document copy.

In example 28 the controller of claim **26** can optionally include means to authenticate the electronic device.

In example 29 the computer-readable code of claim **26** can optionally include at least one device identifier which uniquely identifies the device and at least one user credential.

In example 30 the controller of claim **26** can optionally include means to receive a request to access the document copy, generate an authentication code for the document copy, and present an image of the document copy on a display, wherein the image comprises the computer-readable code.

In example 31 the document copy of claim **30** can optionally include a hologram logic which, when executed by the controller, configures the controller to detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

In example 32 the controller of claim **31** can optionally include means to determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

The terms "logic instructions" as referred to herein relates to expressions which may be understood by one or more machines for performing one or more logical operations. For example, logic instructions may comprise instructions which are interpretable by a processor compiler for executing one or more operations on one or more data objects. However, this is merely an example of machine-readable instructions and embodiments are not limited in this respect.

The terms "computer readable medium" as referred to herein relates to media capable of maintaining expressions which are perceivable by one or more machines. For example, a computer readable medium may comprise one or more storage devices for storing computer readable instructions or data. Such storage devices may comprise storage media such as, for example, optical, magnetic or semiconductor storage media. However, this is merely an example of a computer readable medium and embodiments are not limited in this respect.

The term "logic" as referred to herein relates to structure for performing one or more logical operations. For example, logic may comprise circuitry which provides one or more output signals based upon one or more input signals. Such circuitry may comprise a finite state machine which receives a digital input and provides a digital output, or circuitry which provides one or more analog output signals in response to one or more analog input signals. Such circuitry may be provided in an application specific integrated circuit (ASIC) or field programmable gate array (FPGA). Also, logic may comprise machine-readable instructions stored in a memory in combination with processing circuitry to execute such machine-readable instructions. However, these are merely examples of structures which may provide logic and embodiments are not limited in this respect.

Some of the methods described herein may be embodied as logic instructions on a computer-readable medium. When executed on a processor, the logic instructions cause a processor to be programmed as a special-purpose machine that implements the described methods. The processor, when configured by the logic instructions to execute the methods described herein, constitutes structure for performing the described methods. Alternatively, the methods described herein may be reduced to logic on, e.g., a field programmable gate array (FPGA), an application specific integrated circuit (ASIC) or the like.

In the description and claims, the terms coupled and connected, along with their derivatives, may be used. In particular embodiments, connected may be used to indicate that two or more elements are in direct physical or electrical contact with each other. Coupled may mean that two or more elements are in direct physical or electrical contact. However, coupled may also mean that two or more elements may not be in direct contact with each other, but yet may still cooperate or interact with each other.

Reference in the specification to "one embodiment" or "some embodiments" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least an implementation. The appearances of the phrase "in one embodiment" in various places in the specification may or may not be all referring to the same embodiment.

Although embodiments have been described in language specific to structural features and/or methodological acts, it is to be understood that claimed subject matter may not be limited to the specific features or acts described. Rather, the specific features and acts are disclosed as sample forms of implementing the claimed subject matter.

What is claimed is:

1. A controller, comprising:

logic, at least partially including hardware logic, configured to:

receive an electronic document copy, wherein the electronic document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic;

generate, with the authentication algorithm received with the electronic document copy, a security key for the electronic document copy based on at least one input from a user;

transmit the security key to a remote device; and

store the electronic document copy and a computer-readable code which uniquely associates the electronic document copy with the electronic device in a memory.

2. The controller of claim **1**, wherein the electronic document copy comprises at least one of:

a photograph of the user of the document copy;

a credential of the user of the document copy; and

a biometric identifier of the user of the document copy.

3. The controller of claim **1**, wherein the logic is configured to authenticate the electronic device.

4. The controller of claim **1**, wherein the computer-readable code comprises at least one device identifier which uniquely identifies the device and at least one user credential.

5. The controller of claim **1**, wherein the logic is configured to:

receive a request to access the electronic document copy,

generate an authentication code for the electronic document copy; and

present an image of the electronic document copy on a display, wherein the image comprises the computer-readable code.

6. The controller of claim **5**, wherein the electronic document copy comprises a hologram logic which, when executed by the controller, configures the controller to:

detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

7. The controller of claim **6**, wherein the logic is configured to:

determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

8. An electronic device, comprising:

a display device;

a controller comprising:

logic, at least partially including hardware logic, configured to:

receive an electronic document copy, wherein the electronic document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic;

generate, with the authentication algorithm received with the electronic document copy, a security key for the document copy based on at least one input from a user;

transmit the security key to a remote device; and

store the document copy and a computer-readable code which uniquely associates the electronic document copy with the electronic device in a memory.

9. The electronic device of claim **8**, wherein the electronic document copy comprises at least one of:

a photograph of the user of the electronic document copy;

a credential of the user of the electronic document copy; and

a biometric identifier of the user of the electronic document copy.

10. The electronic device of claim **8**, wherein the logic is configured to authenticate the electronic device.

11. The electronic device of claim **8**, wherein the computer-readable code comprises at least one device identifier which uniquely identifies the device and at least one user credential.

12. The electronic device of claim **8**, wherein the logic is configured to:

receive a request to access the electronic document copy,

generate an authentication code for the electronic document copy; and

present an image of the electronic document copy on a display, wherein the image comprises the computer-readable code.

13. The electronic device of claim **12**, wherein the electronic document copy comprises a hologram logic which, when executed by the controller, configures the controller to:

detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

14. The electronic device of claim **13**, wherein the logic is configured to:

determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

15. A computer program product comprising logic instructions stored on a non-transitory computer readable medium which, when executed by a controller, causes the controller to:

receive an electronic document copy from a remote device, wherein the electronic document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic;

generate, with the authentication algorithm received with the electronic document copy, a security key for the electronic document copy based on at least one input from a user;

transmit the security key to a remote device; and

store the electronic document copy and a computer-readable code which uniquely associates the electronic document copy with the electronic device in a memory.

16. The computer program product of claim **15**, wherein the electronic document copy comprises at least one of:

a photograph of the user of the electronic document copy;

a credential of the user of the electronic document copy; and

a biometric identifier of the user of the electronic document copy.

17. The computer program product of claim **15**, further comprising logic instructions stored on a non-transitory computer readable medium which, when executed by a controller, cause the controller to authenticate the electronic device.

18. The computer program product of claim **15**, wherein the computer-readable code comprises at least one device identifier which uniquely identifies the device and at least one user credential.

19. The computer program product of claim **15**, further comprising logic instructions stored on a non-transitory computer readable medium which, when executed by a controller, cause the controller to:

receive a request to access the electronic document copy,

generate an authentication code for the electronic document copy; and

present an image of the electronic document copy on a display, wherein the image comprises the computer-readable code.

20. The computer program product of claim **15**, wherein the electronic document copy comprises a hologram logic which, when executed by the controller, configures the controller to:

detect when the display is exposed to an ultraviolet light source, and in response thereto, to generate a holographic pattern on the display.

21. The computer program product of claim **20**, further comprising logic instructions stored on a non-transitory computer readable medium which, when executed by a controller, cause the controller to:

determine a location for the holographic pattern based at least in part on a multifactor authentication algorithm.

22. A processor-based method to manage electronic authentication documents, comprising:

receiving an electronic document copy, wherein the electronic document copy comprises an identifier which uniquely identifies an electronic device and an authentication algorithm logic;

generating, with the authentication algorithm logic received with the electronic document copy, a security key for the electronic document copy based on at least one input from a user;

transmitting the security key to a remote processing device; and

store the electronic document copy and a computer-readable code which uniquely associates the document copy with the electronic device in a memory.

23. The method of claim **22**, wherein the electronic document copy comprises at least one of:

a photograph of the user of the electronic document copy;

a credential of the user of the electronic document copy; and

a biometric identifier of the user of the electronic document copy.

24. The method of claim **22**, wherein the logic is configured to authenticate the electronic device.

25. The method of claim **22**, wherein the logic is configured to:

receive a request to access the electronic document copy,

generate an authentication code for the electronic document copy; and

present an image of the electronic document copy on a display, wherein the image comprises the computer-readable code.

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